

extremely heavy—a small portion 12 x 7 x 6 cm weighed 450 grams when completely dry.

The microstructure of *P. tumulosus* is dimitic, consisting of scanty, thin-walled, hyaline generative hyphae, 3.0-4.5  $\mu\text{m}$  wide, with clamp-connections and very abundant skeletal hyphae up to 5.5  $\mu\text{m}$  wide, which taper at either end to about 2  $\mu\text{m}$ . The skeletal, which are highly refractive in both KOH and Melzer's solution, are only occasionally branched. The spores, 7.0-11.0 x 3.0-3.5  $\mu\text{m}$  (measured from a spore-print of a specimen collected by T. D. Macfarlane (No 113), north-west of Pemberton, Western Australia, May 17, 1975) are thin-walled, hyaline and narrowly elliptic to subcylindric.



Fig. 2.—Spores of *Polyporus tumulosus*. x 666.

Cunningham (1965) described the hyphal structure differently. He indicated that the flesh was formed of densely intertwined hyphae, and interpreted the thick-walled refractive hyphae as freely branched binding hyphae. No evidence for such an interpretation was found in any of the specimens examined. Indeed a remarkable feature of the tissue of the cap is that when placed in 10% KOH it dissociates very readily on wetting and scarcely any dissection is necessary to distinguish individual hyphae.

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#### REFERENCES:

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#### SOME OBSERVATIONS ON THE BEHAVIOUR OF THE RED-AND-BLACK SPIDER, *NICODAMUS BICOLOR* (THERIIDAE)

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The following account records observations made between June 15, 1976 and August 24, 1977, on the web, food, mating behaviour, egg-laying and time of development of captive individuals of the Red-and-Black Spider, *Nicodamus bicolor*. Five specimens were collected at Gidgieganup in the Avon Valley on June 15, 1976. They were found under flakes of rock on an outcrop beside a stream. Only a female survived after having eaten the other four. On August 7 a male and female were collected from the same site. These three were kept together in a glass terrarium (30 x 15 x 22 cm) with a glass divider leaning against one end. By mid-August one of the females had been eaten, leaving a pair, the subject of this article.

**Appearance of the spiders:** They are small. At maturity the body length of both sexes is 12 mm. The legs of the female are 16 mm and of the male 22 mm. They are red with a black tarsus. The abdomen is globular, black, hairy and glossy. The spinnerets and anal tubercle and the immediate area around them are red, and situated at the extreme tip of the

abdomen, not on the ventral surface as in most spiders. The male has slightly more prominent spinnerets than the female. The cephalothorax is also bright red and the palps are red with black tips, long and with a pronounced black tarsus in the male.

**The Web:** In the field webs of this species generally can be seen to consist of a tangle supporting an irregular sheet beneath which the spider lives. However in captivity, as is often the case with web-weaving spiders, the complete and normal web is not constructed. In the case of the spiders in my terrarium very little web was constructed before the mating period, only a small tangle on the roof of the cage. The spiders hung mostly upside down in this, occasionally roaming in its vicinity. At mating time the female constructed a large tangle web in the triangle formed by the glass side of the terrarium and inclined divider. In the centre of this, one small area, approximately 25 mm square, was used consistently for mating purposes. As each successive act added more silk to the thick tangle it appeared like thick cotton wool after a while. At no time did the web appear to have any definite form. All the food is well wrapped in silk *before* eating and the packages stored neatly in one corner of the cage floor.

**Food:** Flies mainly, together with moths and other small insects. The spiders were especially partial to black aphids on a citrus branch but were not very keen on beetles.

**Behaviour:** At first the two spiders, male and female, kept to each end of the terrarium, occasionally roaming within their own territories. On October 20, 1976, the female moulted. After this she made occasional visits to the male's territory but made no attempt to capture him for food. On November 15 the male moulted. Physical changes were marked. The legs became very long, almost twice the length of the female's. The book lungs appeared very swollen as did the black palps. During the week the female paid many visits as though inviting him to her corner of the terrarium. The male eventually followed. Mating was first noted on November 21 and it lasted over one hour. Subsequent matings, of about five minutes duration, were noted on November 25 and infrequently until December 6, on which day they took place repeatedly for 15 minutes between one hour intervals. No subsequent mating was noticed.

**Mating technique:** The male approaches the female face to face, climbs over her back and then slips sideways to underneath so that their ventral surfaces face and their heads are in opposite directions. The palps are inserted singly as a rule but sometimes together. There was no resistance by the female and she did not have to be held by the male. No particular position in the web was maintained (i.e. horizontal, vertical, etc.). Some mating advances were made by the female which approached the male on the outer web and returned with him to the mating web. During the whole period the pair remained together in the same web and appeared to be a very affectionate couple, frequently "holding hands". No attempt was made by the female to attack the male, though she often collided with him when in pursuit of other prey. Although the female is quite hungry at this time the male eats little, but drinks a great deal.

**Sperm induction:** The male passes his abdomen across a small pebble on the floor of the cage (the same one each time). The sperm is then transferred to his palps. Most activity occurs at night.

**Post-mating behaviour and the end of the male:** Between December 7 and 16 all mating ceased and the male was ignored by the female, although an accidental touch from her caused him to vibrate rapidly. After December 16 the female seemed irritable and pushed him away whenever he went near her. The female killed and partly ate the male on December 19, but wrapped very little silk around him, putting the body separate from the other food in store. From then on she began to swell and was very hungry. When quite heavy she ceased chasing her prey as actively

as before. Her web was then almost a sheet on about a 60° angle to the floor. She sat upside down in the middle with her legs holding each side of the web and swung it backwards and forwards, causing any insect in the web to flutter and entangle itself, while at the same time signalling its position to the spider. In this way she used up less energy in her heavy state. On December 30 she started collecting the food from her store and stringing the packages with some leaf litter to the web. The male's body was not used.

**Egg-laying:** On February 1, 1977 the female laid her eggs in a bag of silk while suspended from her usual position in her web. These were reddish-brown, about the size of a pin head and resembled fish roe. She then completed the cocoon by covering the top with silk, forming a round, fluffy ball of it. Egg-laying and completion of the cocoon took 24 hours, with frequent resting pauses. The temperature that day was 36.4° C maximum, and 20° C minimum. After laying her eggs the female did not eat or drink, ignored easy prey, and sat holding her cocoon protectively. This was not easy as it was much bigger than she was, being 1.3 cm in diameter.

On February 23 the eggs hatched, after an incubation period of 22 days. The temperature at the time was 25° C. The young were identical in appearance to the parent spider. The mother did not cannibalize her young, which stayed within the silken outer cover of the egg sack.

The mother died on February 25. The babies stayed near the egg sack for the following few days and ate their mother. Their growth rate was very slow.

On March 9 the young started dispersing. They began eating the "packages" and later they ate the male parent and some small aphids.

The terrarium was moved to an outside shed on April 14 and the growth rate of the young spiders increased. They became diurnal and all retreated to the web around the egg sack about 5 p.m. There are about 50 young now and still no cannibalism has been noted. The food comprises mainly small aphids and small moths.

On August 24 the young appeared to be only half grown, suggesting a possible maturing period of more than 12 months.

### A NEW RECORD OF *ASPLENIUM OBTUSATUM* FORST. F. VAR. *OBTUSATUM* IN WESTERN AUSTRALIA

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The Shore Splenwort, *Asplenium obtusatum* Forst. f. var. *obtusatum*, is a fern inhabiting maritime cliffs of southern temperate and sub-antarctic regions. Its distribution includes extra-tropical South America (S.W. Chile and Juan Fernandez I.), Pacific islands, Kermadec I., New Zealand (North and South Is.), Three Kings and Stewart I., Chatham I., Antipodes I., Auckland I., Campbell I., southern Australia, and Tristan da Cunha and Gough I., to the south west of South Africa.

In Australia this species has been recorded from sea cliffs in Queensland, New South Wales, Victoria, Tasmania and South-Western Australia. It has not been recorded from South Africa, as one might expect, considering the latitude of the Cape Peninsula. Taylor (1955) did not record it from Maequarie I., although he recorded *Blechnum penna-marina* Kuhn., *Polystichum vestitum* Presl and *Polypodium billardieri* R.Br.—three ferns of southern temperate and sub-antarctic regions, one or other of which has been recorded as associated with *Asplenium obtusatum* over its circumpolar distribution.

This hardy fern inhabits shallow soil of clefts and shelves of sea cliffs, usually in sites high above the sea and exposed to salt-laden winds.